National Park Service
U.S. Department of the Interior

Federal Lands Transportation Program

Toklat River Bridge and Causeway Replacement

Above: The East Bridge of the Tolkat River crossing on the Denali Park Road. (Photo by John Seibert.)

Project Description. The Toklat River region is known for its classic mountain scenery and quick access to large expanses of alpine tundra deep in the Alaska Range. The wide-open gravel bar of the eastern branch of the Toklat River—at Milepost 53 on the Denali Park Road—is surrounded by high, rugged peaks and slopes of alpine tundra that come right down to the river. In this area this is above the tree line, and there are large glaciers and extensive glacial moraines at the Toklat headwaters.

The Denali Park Road crosses a 2000-foot-wide braid plain of the Toklat River. Gravel scraped from the riverbed was first used in 1931 in the construction of the causeway crossing the Toklat River. The riverbed has been mined annually or biannually since 1985 for continued maintenance of the Denali Park Road and to provide construction material for other park projects.

Floodplain modification impacts. The National Park Service (NPS) is responsible for avoiding, to the extent possible, impacts associated with floodplain modification. Recent studies indicate that the gravel extraction is having an effect on the Toklat River floodplain.

Cross sections surveyed to monitor the river channel were first established in 1988 and have been re-surveyed every one to five years since. A preliminary study was completed in 2012 that included field monitoring and subsequent analysis of the gravel extraction in the region near the Toklat Road Camp, as required by the Gravel Acquisition Plan Analysis EA Statement of Findings (2003). That study and analysis is supported by a recent assessment of bank protection in the vicinity of the Toklat Road Camp.

Current thinking is that the causeway, as designed and constructed, has contributed to some degree to the modification of the natural geomorphology of the floodplain. The Denali Park Road causeway is an artificial constriction, and the build-out of a sediment wedge has formed to the west of the eastern bridge span. The dynamics of the confluence and flow through the span itself have been altered.

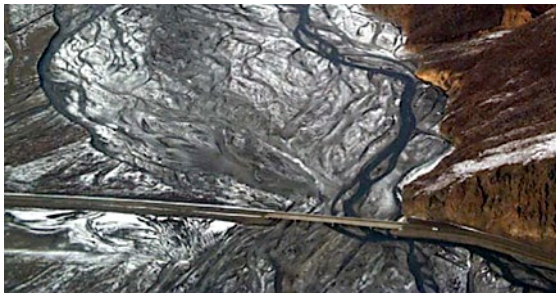
Since 2005 all the surface flow has been conveyed under the east bridge span. An artificial constriction like the causeway will change the river dynamics, and commonly observed channel responses evolve over time. Upstream of such a constriction the

Mega-Project* Profile: Name of Project

Estimated cost: $25 million

Percentage of Alaska Region FLTP Annual Allotment: 455%

Percentage of NPS FLTP Annual Allotment: 12.5%



Top: The Toklat Bridge looking north. (Photo by Simone Winkler)

Middle: Gravel bar downstream from the Toklat Bridge. (NPS Photo)

Bottom: Aerial of the Toklat Bridge and braided streambed. (NPS Photo)

* Mega Projects: The NPS transportation system is supported, in part, by funds from the Federal Lands Transportation Program (FLTP). Currently, the NPS is authorized an annual budget of $268 million from the FLTP. These funds are apportioned by formula among the seven NPS Regions. Most of these funds are used for "transportation asset management" – that is, to pay for the work required to keep existing assets in good condition. There are some projects, such as a major bridge repair or ship replacement, that require a much larger amount of funding than is available on an annual basis to a Region. These we call "Mega Projects." The NPS is pursuing strategies to fund these projects.

stream power and gradient tends to decrease, causing bed load deposition within and adjacent to the river channel. At the constriction the channel may deepen, resulting in a more efficient transport of bed load through and past the constriction.

The end result is often an incised channel, a simplification of the channel form, and terrace formation at both upstream and downstream of the constriction. Because of these effects, which in part mirror those of downstream gravel mining, it is difficult to separate the reach-scale magnitude of braid plain constriction caused by the causeway relative to the downstream gravel mining. Both would be expected to reduce the net flux of sediment through the reach for any given discharge—the former because of the induced deposition of some fraction of the sediment load owing to a reduction in stream power and the latter because some portion of the remaining sediment flux is simply being removed.

The result would be some combination of overbank deposition and channel incision, with the net result that a volume of sediment would be permanently removed from net downstream transport. The volume of that now-inactive sediment is represented by a bar of material about 4000 feet long and 1000 to 2000 feet wide that now stands about 4 feet above the level of the active braid plain upstream of the causeway; a somewhat smaller deposit is readily visible downstream of the east bridge of the causeway.

This suggests that the average rates of the two primary human impacts to the Toklat River, causeway construction and gravel mining, are of roughly equivalent magnitude, albeit expressed in very different ways and at somewhat different locations. Downstream of the project reach, however, their long-term consequences on sediment flux and river morphology are likely additive.

Replacing the Causeway. The proposed project will replace the current causeway with a structure that imposes minimal alteration to the natural geomorphological processes of the Toklat River. Currently, bed load deposition and channelization are creating instability of the riverbank adjacent to the Toklat visitor and administration facilities located immediately north and west of the causeway. Corrective action will ensure long-term use of these facilities that are critical to the operation and maintenance of the park road.

The result of this completing this project will reduce impacts to the natural processes of the Toklat River, alleviate damage to the riverbank and adjacent park facilities, minimize maintenance of the causeway, enhance the visitor experience, and reduce yearly costs associated with emergency maintenance measures to keep the road and rest stop passable.